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ABSTRACT

This study was conducted in an attempt to identify any predictor or combination of predictors of a beginning typewriting student's success. Variables of intelligence, rhythmic ability, musical background, and tapping ability were combined to study their relationship to typewriting speed and accuracy. A sample of 109 high school students was pretested using the Seashore Rhythm Test, Digit Recall Test, and the Tapping Test. The students were then posttested at the end of the first semester of instruction to obtain speed and accuracy scores from an average of three three-minute timed writings. Additionally, the motivation control variables of assignments completed and absences were introduced into the analysis. A least-square stepwise multiple regression analysis was employed to analyze the data. The stepwise results indicate that the motivation variable, assignments completed, was the most significant factor in predicting typewriting speed. Beyond motivation, the Tapping Test had a significant zero order correlation with speed. No predictor tests used in this study were able to predict typewriting accuracy. Analysis of the data obtained supports the possibility of predicting a student's typewriting speed based on motivation and the Tapping Test, the predictor variable. (Author/KC)

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THE RELATIONSHIP BETWEEN A LINEAR COMBINATION OF INTELLIGENCE, MUSICAL BACKGROUND, RHYTHM ABILITY AND TAPPING ABILITY TO TYPEWRITING SPEED AND ACCURACY

by

Cheryl H. Fante

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Adult and Vocational Education in the University of South Florida

August, 1980

Major Professor: Mary Wilkes Durso

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with a major in Vocational Education has been approved by the Examining Committee on August 18, 1980, as satisfactory for the thesis requirements for the Master of Arts Degree.

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Attempts to identify any predictor or combination of predictors of a beginning typewriting student's success was the purpose of this study. Variables of intelligence, rhythm ability, musical background, and tapping ability were combined to study their relationship to typewriting speed and accuracy.

A sample of 109 high school students were pretested using the Seashore Rhythm Test, Digit Recall Test, and the Tapping Test. The students were then posttested at the end of the first semester of instruction to obtain speed and accuracy scores from an average of three 3-minute timed writings. Additionally, the motivation control variables of assignments completed and absences were introduced into the analysis. A least squares stepwise multiple regression analysis was employed to analyze the data.

The stepwise results indicate that the motivation variable, assignments completed, was the most significant factor in predicting typewriting speed. Beyond motivation, the Tapping Test had a significant zero order correlation with speed. No predictor tests used in this study were able to predict typewriting accuracy.

Analysis of the data obtained supports the possibility of predicting a student's typewriting speed based on motivation and the Tapping Test, the predictor variable.

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CHAPTER I

THE PROBLEM

Presentation of the Problem

The development of speed and accuracy have always been a major concern for typewriting teachers. It would be helpful to predict a student's typewriting success so that individual practice procedures could be based on aptitude. Studies which have been completed in ability prediction attempt to show the relationship of intelligence (Gregg, 1967; Laster, 1974; Prater, 1976; Robinson, 1966); rhythm ability and musical background (Nelson, 1976; Patchin, 1966; Tetley, 1945); and tapping ability as related to typewriting ability (Boose, 1974; Flanagan and Grace, 1964; Rainey, 1976). None of these studies combined all of these factors in studying their relationship to a beginning typewriting student's speed and accuracy at the end of the first semester of instruction.

Elements of the Problem

This study was designed to compare the following student data to students' speed and accuracy scores in typewriting:

1. digit recall pretest scores (intelligence measure).
2. rhythm ability pretest scores (musical aptitude).

3. presence or absence of musical background (previous experience factor).

4. tapping ability pretest scores (tapping ability measure).

5. record of the number of absences throughout the first semester of study (motivation factor).

6. record of the number of assignments completed throughout the second nine weeks of instruction (motivation factor).

7. record of previous typewriting instruction (previous experience factor).

8. a combination of the above measures.

Importance of the Study

It appears that no typewriting pretests have been entirely successful in predicting the beginning typewriting student's success at the end of the first semester of typewriting. This study, therefore, attempts to identify any predictor or combination of predictors of a beginning typewriting student's success by employing the same dependent variables for a set of independent variables. Four different pretests were used to analyze any possible relationship between the independent pretest variables of intelligence, musical background, rhythm ability, and tapping ability and the dependent posttest variables of speed and accuracy on a three-minute timed writing score.

Hypothesis

The research hypothesis for this study was that there is a significant relationship between linear combinations of intelligence, musical background, rhythm ability, and tapping ability to typewriting speed and accuracy.

Delimitations

1. All students used Olympia electric typewriters.

2. The chronolgical age of the students did not differ in excess of three years.

3. Fifty percent of the students had received six weeks or more of previous typewriting instruction.

4. The motivation of students was not known in this study.

5. The six classes were taught by two different instructors--two by the researcher and four by another teacher.

Limitations

1. No attempt was made to control factors such as instructional methods used by the teachers or other factors that tend to make one classroom group differ from another.

2. The Tapping Test has questionnable validity, but is not a crucial factor to this study.

3. All data used in this study are derived from students enrolled in one public high school.

Definition of Terms

The following terms are defined to communicate the measures in this study:

1. Straight copy is printed material in essay form used in the timed writings to determine the gross words per minute typed.

2. Timed writing is a straight copy achievement test with a set time limit emphasizing speed and accuracy.

3. Typewriting speed is the gross words typed per minute on a straight-copy timed writing.

4. Typewriting accuracy is the total typewriting errors per minute typed on a straight-copy timed writing.

5. Gross words a minute (GWAM) is the method of scoring a timed writing which is computed by dividing the number of words typed by the number of minutes of the writing, with no penalty deduction for errors.

6. Correct words a minute (CWAM) is the method of scoring which is computed by deducting one point for each error from the gross words typed, and then dividing by the number of minutes of the writing.

7. Tapping ability is a measure of the number of correct rapid tapping performances by beginning typewriting students on the "Tapping Test."

8. Rhythm ability is a measure of the number of correct responses to the Seashore Rhythm Test.

9. Musical background is the presence or absence of a students previous experience in playing a musical instrument.

Statistical Method

A least squares stepwise multiple regression analysis was used to determine whether or not typewriting ability can be predicted from the independent variables of intelligence, rhythm ability, musical background, tapping ability, and previous typewriting experience. In addition, two motivation control variables (absences and assignments), a delimitation in this study, were introduced into the data analysis as an independent variables. The analysis and interpretation of the data collected for this study are presented in the following chapters.

Organization of the Study

This study is organized into five chapters:

The first chapter includes the presentation of the problem, elements of the problem, importance of the study, hypothesis, delimitations, limitations, definition of terms, statistical method, and organization of the study.

Chapter two includes a review of related literature.

The third chapter states the general plan and procedures.

The fourth chapter presents the analysis of the data, including charts of results and interpretation of the findings.

In chapter five a summary of the study is stated, conclusions based on the findings of the study are given, and recommendations for further study are made.

Following chapter five are the references and appendices.

CHAPTER II

RESEARCH OF RELATED LITERATURE

Since typewriting speed and accuracy are the primary objectives of typewriting instruction, numerous studies and texts have been written on this subject. The literature reviewed here deals with speed and accuracy only as it relates to (1) intelligence, (2) musical background, (3) rhythm ability, and (4) tapping ability. The first part of this chapter reviews studies related to the independent variables used in this study. Next a short section on motivation as it relates to skill building is presented since two of the control variables employed in the study design relates to motivation.

Intelligence Factors

Studies conducted with respect to intelligence and typewriting have examined intelligence quotients and other predictors as they relate to typewriting skills measured by straight copy speed and accuracy. In a study of 95 college students enrolled in an intermediate typewriting course, Prater (1976) reported the effects on achievement of intelligence levels and types of drill materials. No significance was found between groups subdivided by levels of intelligence and types of drill materials on straight-copy accuracy and production-copy accuracy.

Similar findings were reported by Robinson (1966) wherein a correlation coefficient of r = -.04 to .04 showed no significant correlation between IQ and accuracy. However, intelligence quotients as a predictor of speed had a coefficient of r = .34 to .40, indicating some relationship between intelligence and speed.

Gregg (1967) attempted to determine if intelligence test scores, reading test scores, grade point averages, or motivation rating scales were related to straight-copy speed and accuracy. The only significant finding was that a student's IQ could be used as a predictor of straight copy speed. The other scores were not found to be significant as predictors of straight copy accuracy.

Laster (1964) conducted a study to determine the relationship between IQ scores and/or grade point averages to typewriting speed and accuracy. Using the Short Test of Educational Ability, no significant relationship was found between high, medium, or low IQ groups, nor between the high, medium, or low groups of grade point average and their speed and accuracy performance, using Correct Words A Minute (CWAM) on straight copy material.

It should be noted that the CWAM measure used by Laster represents a composite score of both speed and accuracy with a penalty against speed for errors, thus reducing the actual speed reported as well as giving no indication of accuracy achievement levels. It may also be that by using this CWAM

measure, the effect of the independent variable was lost in the adjustment of GWAM. This could account for the difference in findings between the Robinson, Gregg and Laster studies.

Rhythm Ability and Musical Background Factors

Studies are limited in which musical background relates to typewriting speed and accuracy. Principles of speed and rhythm, as well as finger movement, play vital roles in both the skills of typewriting and musical instruments (Tetley, 1945).

Shafer (1976) dealt with the theory that speaking, typing, and playing music is a family of skills with the common factor "that they produce responses in continual sequence in a definite order and often at a fast rate" (p. 375). In each skill there is a hierarchic model of stimulus-response rather than finite state. This can also account for errors in typing, speech, and piano playing based on individual response to stimuli.

In a study by Nelson (1976), 254 students were tested to determine if there is any relationship between the ability to play music and the ability to typewrite more rapidly. It was found that students with a "musical background" scored higher on a three-minute timed writing than those who had no "musical background" at the .05 level of significance. An even higher significance level of .01 was found between students of high rhythm ability, as determined from the Drake Rhythm and Memory Test scores, and typewriting accuracy.

Beginning typewriting students from three cities in Minnesota were participants in a study to determine whether there might be some relationship between musical aptitude and the ability to learn to typewrite (Patchin, 1966). These 108 students were given the "Drake Musical Aptitude Tests." Significance at the .05 level was found between the memory section of the "Drake Musical Aptitude Tests" and speed and accuracy. However, no significant relationship was found between the rhythm section and typewriting speed.

Tapping Ability Factors

The Tapping Test used in this study is somewhat similar in part to the "Tapping Test" by John C. Flanagan. The reliability coefficient is .90 for the Flanagan Tapping Test, which predicts the ability to operate keyboard machines (Flanagan, 1964).

Boose (1976) used Flanagan's "Tapping Test" and found that "beginning typing students classified as having high tapping ability were found to type more gross words per minute at the .05 level of significance" than students classified as low tapping ability (p. 63). An internationally acclaimed expert in the field of typewriting, Leonard West (1957) stated, "Specific to typewriting, 'The Tapping Test' may be a useful and valid predictor of stroking skill. . . ." (p. 522).

Stroking skill is the ability to tap quickly and accurately with a finger while separately and independently

controlling the others. It is also the ability to respond with a specific finger after perceiving a letter or symbol (Boose, 1974). A random sample of 120 beginning typewriting students in New Jersey was given Flanagan's "Tapping Test" to determine the effect of tapping abilities in the initial development of typewriting skills (Boose, 1974). It was found that students with high-tapping ability typed more mean gross words per minute (GWAM) than students with low-tapping ability on both regular and tactile cue keyboards at the level of significance of .05.

Another study tested 148 students on the Flanagan "Tapping Test" to determine the effect of dexterity on speed and accuracy (Rainey, 1976). Findings were that at the .05 level of significance, there was a negative correlation between dexterity and number of errors at various attained speeds. Dexterity had no significance on the outcome of GWAM at low speeds, but a positive correlation was found between dexterity and typewriting ability under practice conditions of high speeds of pacing.

Motivation Factors

"Learner interest and motivation, plus proper teacher guidance and information feeding will enhance the increases of skill at higher levels" (Nellermoe, 1973, p. 252). Many activities such as walking, music, athletics, typewriting, and shorthand require manipulation and movement and vary in complexity, which is relative to the performance outcome.

Additionally, mental and motivational factors are important in achieving higher levels of performance. "Continued skill improvement in typewriting (as in other complex skills) is a time process conditioned by a strong motivational factor to improve" (p. 251).

In a recent review of motivation and achievement, 18 studies were analyzed using analysis of variance and regression techniques. The motivation factors used were "general academic, or mathematics self-concept, locus of control, and achievement motivation; achievement outcome measures included achievement and ability tests and grade point indices" (Ugruoglu and Walberg, 1979). It was found that for grades one through twelve, 232 uncorrected observed correlations showed a mean of .338 indicating 11.4 percent of the variance accounted for in achievement by motivation. A mean correlation of .16 was found on the general ability tests and .25 was found on the non-verbal ability tests (p. 375).

Speed and Error Scores

In over 1000 students tested in six studies, the relationship for speed ranged from .80 to .91, which indicates that measures of speed have been found to be extremely stable. However, it was found that errors fluctuate widely and therefore, are unreliable (West, 1957). The relationship "between words-per-minute speeds and number of errors was as often negative as positive, and always quite low" (p. 57).

Summary

A review of the related literature has revealed that researchers have had more success in predicting typewriting speed than in predicting typewriting accuracy. Findings on the predictive measures of intelligence and rhythm ability are inconsistent. Tapping ability, musical background, and motivation were found to be more consistent measures of typewriting achievement than the other variables reviewed. No two studies used exactly the same dependent variables, thus making comparisons difficult.

CHAPTER III

THE GENERAL PLAN AND PROCEDURES

The primary concern of this study is the relationship between pretests of intelligence and typewriting scores; musical background and typewriting scores; rhythm ability and typewriting scores; and tapping ablity and typewriting scores; as well as a combination of these pretest scores and typewriting scores. Published tests and tests developed by recognized educators were used to obtain predictive measures for this study. Prior to the development of this study a pilot study was conducted in the spring of 1979 which indicated that intelligence, musical background, rhythm ability, and tapping ability scores appeared to be predictive of a student's speed and accuracy scores. Therefore, this study was undertaken under controlled research conditions to determine if these factors could be shown to have a significant relationship to typewriting speed and accuracy.

The Sample

In September of 1979, 142 students enrolled in beginning typewriting were given a background questionnaire (see Appendix A) containing personal questions and questions about their musical and typewriting history.

The population from which the student sample was drawn consisted primarily of lower to middle income families in the southern quadrant of Hillsborough County, Florida (Faculty Self-Study, 1980). The students were enrolled in six beginning typewriting classes which were taught by two teachers--two classes by the researcher and four by another teacher. Completed measures from 109 participants were obtained from the enrollment of 142 students.

Testing

All pretests were given to each class separately, in the same room without interruption, and were completed within the fifty-five minute class period. In each testing group, at least one other individual observed the students to monitor the accurate completion of test instructions.

The posttest scores were derived from a combination of three 3-minute straight-copy timed writings given during the last week of the first semester of typewriting (See Appendix B).

Text

All participating classes used the same text: Century 21 Typewriting, Book 1, second edition, (Lessenberry, 1977).

Instrumentation

Independent Variables

The Digit Recall Test, the Seashore Rhythm Test, and the Tapping Test were administered by the researcher on September 25, 1979, to all classes. Musical background and typewriting history were obtained from the student questionnaire (see Appendix A). The two measures of motivation (absenses and assignments completed) were obtained from the teachers' records.

Digit Recall Test. The Digit Recall Test used in this study (Durso, 1973) is in the process of copyright. It is somewhat similar to the Digit Span Test of the Wechsler Adult Intelligence Scale but is shorter, scored on a different basis and designed for group administration. The Durso test has a .92 correlation with the Wechsler Adult Intelligence Scale.

Used herein the test consists of two parts: Part I requires that students fill in blocks writing numbers from left to right after each set has been completely dictated.

Part II requires that students fill in blocks writing numbers in reverse order from the manner dictated after each set has been completely dictated. Pencils are laid on the desk during the dictation of numbers. Numbers are dictated at the rate of one number per second, and each set dictated is one number longer than the previous set. The longest digit line correctly completed becomes the student's score.

Rhythm Test. The Rhythm Test as used in this battery is the rhythm portion of the Seashore Measures of Musical Talents. A phonograph record of the test was used for test administration to the students. The Manual of Instructions and Interpretations for the Seashore Measures of Musical Talents (1939 Revision) does suggest a retest for students with questionably low scores, and this was done for some students in this study.

The Rhythm Test consisted of three sets of rhythm items, ten pairs of items in each set. Students responded by selecting the answer of "same" or "different" on an answer sheet depending on their ability to distinguish between the two rhythms presented on the record.

The pertinent data on the Seashore Measures of Musical Talent, Rhythm Test follow: Norms for students in grades nine through sixteen were $n = 4024$, Mean = 26.5, and Standard Deviation = 2.8. Reliability was estimated by means of internal consistency coefficients (Kuder-Richardson Formula 21) at .64 for grades nine through sixteen (Seashore, 1939).

Musical and typewriting background. During the week of September 24, 1979, students were requested to fill out a Questionnaire (see Appendix A). Data relating to the student's purpose in taking the course and participation in athletic games were not used, however, information as to the student's musical history and typewriting history were part of this study.

The musical history is based on a yes or no response to question number nine, "Do you play a musical instrument?" There were 24 students indicating a yes response to this question, 22% of the 109 participants. The typewriting history was based on question number three, "Have you taken a typewriting course which was at least six weeks long or longer?" There were 54 students indicating a yes response to this question, 50% of the 109 participants.

Tapping Test. The origin of this test is unknown; however, it is known to have been used over a period extending from 1945 to the present time. This test has been used as a screening device by employers and employment agencies to select typists for job openings.

In this test, students were given a single page of half inch circles. They were instructed to place a dot in each circle, and to complete as many circles as possible in a sixty-second period of time, proceeding from left to right on each line of circles. The score was obtained from the number of circles with dots.

Absences. In recognition of the necessity to develop kinesthetic responses through keyboard practice, students who had more than five days of consecutive absences from class were eliminated from the original sample of 142 students. In addition, as a limited measure of motivation the absence of students who comprised the study sample (109) were introduced as an independent variable.

Previous Typewriting Instruction. In recognition of the absence or presence of previous typewriting instruction, the sample group was analyzed in three basic analysis groups: (1) all students in the sample (n = 109); (2) students (NPT) who had less than six weeks of previous typewriting instruction (n = 55); (3) students (PT) who had six weeks or more of previous typewriting instruction (n = 54)

Assignments Completed. All classes were given a total of eighteen assignments. As a second limited measure of motivation, students who completed less than eight of the assignments were eliminated from a subset analysis but included in the three basic analysis groups, so that the three basic groups would be representative of a classroom in which both motivated and non-motivated students were involved.

Dependent Variables

During the last week of instruction of the first semester, students were given a timed writing by their instructor on three different days. The timed writings were three minutes in length and selected from the text and corresponding workbook of Century 21 Typewriting, Book 1 (1977) (see Appendix B). Each of the three timed writings used all letters of the alphabet, and had difficulty ratings of 1.5 syllabic intensity, 5.6 average word length, and 80% high frequency words. Each students accuracy and speed score was obtained by averaging the three timed writings.

In the following chapter, the interaction of the independent variables used in this study is presented in accordance with the method outlined here.

CHAPTER IV

ANALYSIS OF THE DATA, TABLES OF RESULTS, AND INTERPRETATION OF THE FINDINGS

Seven independent variables outlined previously were used to determine if there was any relationship between the independent variable scores and the dependent variables of speed and accuracy scores on three-minute timed writings.

For analysis purposes, data were grouped into three basic analysis groups. All students were included in the first basic analysis group, Tables 1 and 4; students with no previous typewriting instruction (NPT), Tables 2 and 5 were included in the second basic analysis group, and those with previous typewriting instruction (PT) were included in the third basic analysis group, Tables 3 and 6. Each of the three basic analysis groups were further divided into a subset which reduced the sample by students who did not complete eight or more assignments. Analytical techniques were identical for all three basic groups and subsets thereof.

Statistical Procedures

The primary statistical tool employed in this study was stepwise multiple regression (forward solution). With this procedure, predictor variables are entered into the

regression equation individually. The first variable entered is the one with the largest zero order correlation with the dependent variable. The second variable entered is the one with the largest semi-partial correlation with the the dependent variable. In this second step, the second variable entering the equation is partialled on the first. This routine is followed thereafter with each entering variable being partialled on those variables that preceeded it into the equation. It is the square of the semi-partial correlation coefficient that is reported as "$\underline{R}^2$ change" in the tables that follow. Since $\underline{R}^2$ is directly interpretable as the proportion of the dependent variable variance that is accounted for by predictor variable(s), $\underline{R}^2$ change may be interpreted as a measure of the degree to which a particular predictor variable adds to the explanation of dependent variable variance given the fact that other variables (may) already be in the equation.

Viewed differently, $\underline{R}^2$ change may be viewed as the degree to which prediction of the dependent variable is enhanced by using a particular predictor variable in conjunction with other variables that are already being used for predictive purposes. ($\underline{R}^2$ change for variables entering on the first step is, of course, an indication of the predictability attained when the variable is used as the sole predictor.)

In addition to the regression procedure outlined above, the zero order correlation (referred to as simple r in the tables) of each predictor variable with the dependent variable was computed. All computations were performed by use of the "Statistical Package for the Social Sciences" (Nie, 1970).

Interpretation of the Findings

A total of seven correlations were computed to test the hypothesis as stated in Chapter I. A least squares stepwise multiple regression was used to evaluate the data. The F ratio is a significance test on R^2 change.

1. Table 1 indicates that the most important variable in predicting speed was assignments completed. As indicated the R^2 was .18. While all of the other variables were significant at the .01 level, only previous typewriting experience seems to increase the R^2 in a fashion that would be deemed of practical significance. As noted in the table, the R^2 change was .132. Of the independent variables considered, only (1.) assignments completed, (2.) previous typewriting experience and (4.) the tapping test had a significant zero order correlation (at the .05 level) with the dependent variable, speed.

TABLE 1

Typewriting Speed of Total Students Group
(n = 109)

	Order of Variable Entry	Simple R	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Assignments Completed	.43*	.18	.1825	23.88*	1, 107
2.	Previous Typing Exper.	.42*	.31	.1320	24.31*	1, 106
3.	Seashore Rhythm Test	.06	.32	.0093	16.76*	1, 105
4.	Tapping Test	.20**	.33	.0036	12.66*	1, 104
5.	Digit Recall Test	-.08	.33	.0026	10.14*	1, 103
6.	Absences	-.16	.33	.0003	8.38*	1, 102
7.	Musical Instrument	.03	.33	.0002	7.12*	1, 101

2. The stepwise results in Tables 2 and 3 indicate that assignments completed was significant at the .01 level in predicting speed. In Table 2, the tapping test and musical background were significant at the .05 level; and in Table 3, musical background and the Seashore Rhythm Test showed significance on the R^2 change at the .05 level. In terms of the simple r, assignments completed was significant at the .01 level in predicting speed.

TABLE 2

Typewriting Speed of Students with No Previous Instruction (NPT) (n = 55)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Assignments (0 - 18)	.41*	.17	.1652	10.49*	1, 53
2.	Tapping Test	.21	.19	.0242	6.08**	1, 52
3.	Musical Background	-.13	.20	.0138	4.34**	1, 51
4.	Digit Recall Test	-.03	.22	.0120	3.43	1, 50
5.	Seashore Rhythm Test	.05	.22	.0037	2.75	1, 49
6.	Absences	-.05	.22	.0006	2.25	1, 48

TABLE 3

Typewriting Speed of Students with Previous Instruction (PT) (n = 54)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1	Assignments (0-18)	.45*	.20	.2024	13.20*	1, 52
2.	Musical Background	.14	.21	.0126	6.98**	1, 51
3.	Seashore Rhythm Test	.11	.22	.0077	4.77**	1, 50
4.	Tapping Test	.07	.22	.0014	3.54	1, 49
5.	Digit Recall Test	.04	.22	0010	2.79	1, 48
6.	Absences	-.17	.23	.0002	2.28	1, 47

* Significance at .01 level
** Significance at .05 level

3. Tables 4, 5, and 6, as well as Tables 10, 11, and 12 indicate that none of the independent variables considered show any significant correlations with typewriting accuracy.

TABLE 4

Typewriting Accuracy of Total Students Group (n = 109)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Absences	.16	.02	.0241	2.65	1,107
2.	Assignments (0 - 18)	-.14	.03	.0106	1.91	1,106
3.	Tapping Test	.09	.05	.0128	1.75	1,105
4.	Previous Typing Exper	-.07	.05	.0023	1.37	1,104
5.	Musical Background	.03	.05	.0023	1.14	1,103
6.	Seashore Rhythm	.03	.05	.0007	.95	1,102
7.	Digit Recall Test	Insufficient F Level				

* Significance at .01 level
** Significance at .05 level

TABLE 5

Typewriting Accuracy of Students with No Previous Instruction (NPT) (n = 55)

Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1. Absences	.16	.03	.0308	1.68	1, 53
2. Assignments (0 - 18)	-.17	.05	.0169	1.30	1, 52
3. Tapping Test	.10	.06	.0173	1.18	1, 51
4. Musical background	.08	.07	.0056	.95	1, 50
5. Digit Recall Test	.05	.07	.0027	.77	1, 49
6. Seashore Rhythm Test	.08	.07	.0004	.64	1, 48

TABLE 6

Typewriting Accuracy of Students with Previous Instruction (PT) (n = 54)

Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1. Tapping Test	.10	.009	.0095	.50	1, 52
2. Assignments (0 - 18)	-.08	.02	.0081	.46	1, 51
3. Seashore Rhythm Test	-.06	.02	.0051	.38	1, 50
4. Absences	.07	.02	.0022	.31	1, 49
5. Digit Recall Test	.02	.03	.0023	.27	1, 48
6. Musical background	Insufficient F Level				

* Significance at .01 level
** Significance at .05 level

4. The stepwise results shown in Table 7 are very similar to those shown in Table 1, indicating that assignments completed was significant at the .01 level in predicting speed. While all of the other variables were significant at the .01 level, only previous typewriting instruction seems to increase the R^2 in a fashion that would be deemed of practical significance. The independent variables which had a zero order correlation at the .01 level were assignments completed and previous typewriting experience with the tapping test also having a .05 level of significance for the zero order correlation.

TABLE 7

Typewriting Speed of Subset Group 1
Students who Completed 8 or More Assignments
(n = 95)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Assignments (8 - 18)	.41*	.20	.2000	22.95*	1, 93
2.	Previous Typing Exper	.41*	.32	.1200	21.87*	1, 92
3.	Digit Recall Test	-.002	.33	.0100	15.14*	1, 91
4.	Absences	-.22	.34	.0060	11.57*	1, 90
5.	Seashore Rhythm Test	.10	.23	.0030	9.30*	1, 89
6.	Musical Instrument	.04	.34	.0007	7.68*	1, 88
7.	Tapping Test	.18**	.34	.0005	6.52*	1, 87

* Significance at .01 level
** Significance at .05 level

5. The stepwise results given in Table 8 are like those in Table 2 wherein assignments completed was significant at the .01 level in predicting speed. The difference in the tables was that in Table 8, the tapping test was the only variable which added to the preceeding variable in a significant fashion (at the .05 level), with the R^2 change being .168. The predictor variable, assignments completed, again had a significant zero order correlation at the .01 level.

TABLE 8

Typewriting Speed of Subset Group 2 (NPT)
Students who Completed 8 or More Assignments
(n = 47)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Assignments (8 - 18)	.40*	.16	.1576	8.42*	1, 45
2.	Tapping Test	.19	.17	.1680	4.65**	1, 44
3.	Digit Recall Test	.06	.19	.0122	3.29	1, 43
4.	Absences	-.15	.21	.0186	2.71	1, 42
5.	Musical Instrument	-.14	.22	.0144	2.31	1, 41
6.	Seashore Rhythm Test	.10	.22	.0023	1.90	1, 40

* Significance at .01 level
** Significance at .05 level

6. The stepwise results in Table 9 are similar to the results shown in Table 3 in which assignments completed was significant at the .01 level in predicting speed. The second variable, musical background, indicated that by using it in conjunction with the first variable, practical significance was shown at the .01 level. The simple r indicates that assignments completed was significant at the .01 level.

TABLE 9

Typewriting Speed of Subset Group 3 (PT)
Students Completing 8 or More Assignments
(n = 48)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Assignments (8 - 18)	.49*	.24	.2400	14.40*	1, 46
2.	Musical Background	.16	.25	.0100	7.56*	1, 45
3	Digit Recall	.08	.16	.0080	5.14**	1, 44
4.	Seashore Rhythm	.11	.26	.0040	3.86	1, 43
5.	Tapping	.07	.26	.0009	3.03	1, 42
6.	Absences	-.22	.27	.0004	2.47	1, 41

* Significance at .01 level
** Significance at .05 level

TABLE 10

Typewriting Accuracy of Subset Group 1
Students Completing 8 or More Assignments
(n = 95)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Musical Background	.12	.01	.0100	1.34	1, 93
2.	Tapping Test	.12	.03	.0200	1.48	1, 92
3.	Previous Typing Exp	-.05	.04	.0050	1.17	1, 91
4.	Assignments (8 - 18)	-.05	.04	.0040	.97	1, 90
5.	Absences	-.03	.04	.0030	.82	1, 89
6.	Digit Recall Test	.09	.05	.0030	.72	1, 88
7.	Seashore Rhythm Test	.03	.05	.0020	.64	1, 87

TABLE 11

Typewriting Accuracy of Subset Group 2 (NPT)
Students Completing 8 or More Assignments
(n = 47)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Musical Background	.20	.04	.0393	1.87	1, 45
2.	Tapping Test	.13	.06	.0172	1.33	1, 44
3.	Assignments (8 - 18)	-.09	.06	.0060	.97	1, 43
4.	Absences	-.05	.07	.0060	.78	1, 42
5.	Seashore Rhythm Test	.04	.07	.0040	.65	1, 41
6.	Digit Recall Test	-.04	.07	.0002	.53	1, 40

* Significance at .01 level
** Significance at .05 level

TABLE 12

Typewriting Accuracy of Subset Group 3 (PT)
Students Completing 8 or More Assignments
(n = 48)

	Order of Variable Entry	Simple r	R^2	R^2 Chg	F Ratio	Degrees Freedom
1.	Digit Recall Test	.15	.02	.0231	1.09	1, 46
2.	Tapping Test	.13	.04	.0279	.89	1, 45
3.	Seashore Rhythm Test	-.005	.04	.0418	.64	1, 44
4.	Musical background	.03	.05	.0453	.51	1, 43
5.	Assignments (8 - 18)	Insufficient F Level				
6.	Absences	Insufficient F Level				

* Significance at .01 level
** Significance at .05 level

The mean of each independent variable was calculated for each group as follows:

1. For speed, the mean score for the total group is 34.55; for PT, 38.17; for NPT, 31.0.

2. For accuracy, the mean score for the total group is 6.59; for PT 6.35; for NPT, 6.82.

Students in the PT group had higher mean scores for speed and the tapping test and lower mean scores for errors, absences, and digit recall test.

TABLE 13

Independent Variable Means

	Total		NPT		PT	
	Range	Mean	Range	Mean	Range	Mean
Absences	0-18	5.73	0-18	7.16	0-14	4.27
Assign Compl.	0-18	10.60	0-18	10.21	5-16	10.98
Digit Recall	4-17	11.82	4-17	12.42	4-15	11.22
Musical Back.	24 students		14 students		10 students	
Seashore Rhythm	14-30	25.67	14-30	25.80	17-30	25.54
Tapping Test	56-199	127.94	56-175	122.97	86-199	133.00

TABLE 14

Dependent Variable Means

	Total	NPT	PT
Speed	34.55	31.00	38.17
Accuracy (No. of Errors)	6.59	6.82	6.35

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Selected predictive factors which may determine the feasibility of using pretest scores to predict typewriting first semester speed and accuracy achievement was the basis of this study. Any significant relationship to achievement, could indicate the advisability of grouping of students according to ability, in setting meaningful goals and individualizing student practice methods based on aptitude.

The effects of motivation were also examined through the means of the number of assignments completed during the second nine weeks of instruction. The results from these data were compiled in Tables 7 through 12 of the previous chapter.

The total sample of 109 students was divided into several groups for the purpose of analysis. The first basic analysis group (a combination of groups 2 and 3) consisted of all students in the study and their pretest scores in relation to their speed and accuracy scores in typewriting at the end of one semester of typewriting instruction (see Tables 1 - 6).

The second basic analysis group consisted of only those students with no previous typewriting instruction. The third basic analysis group consisted of only those students who had had six weeks or more of previous typewriting instruction. From the sample of 109 students, observations were made of those students who completed eight or more assignments to determine if motivation had any effect on their speed and accuracy scores in typewriting. This reduced the sample size to 95 students, one group of 47 with no previous typewriting instruction, and one group of 48 students who had had six or more weeks of previous typewriting instruction. The statistical method used for each of these subset groups was the same as used on the original sample. The pretest scores, assignments, and absences were compared to speed and accuracy scores (See Tables 7 - 12).

Conclusions

As a result of the findings given in Chapter IV, the following conclusions are made:

1. The results of this study support the possibility of predicting a student's typewriting speed based on his motivation, as determined by the number of assignments completed.

2. The variables which had a significant zero order correlation with the dependent variable of speed were assignments completed, previous typing instruction, and the tapping test.

3. No predictive tests used in this study were able to predict a student's accuracy.

4. Absences correlate negatively with typewriting speed.

5. Intelligence, as determined by the Digit Recall Test, showed no significance in determining speed or accuracy.

6. No high predictability was found in determining speed in either rhythm ability (as determined by the Seashore Rhythm Test) or in musical background.

7. Students with previous typewriting instruction tended to achieve higher speeds and type with greater accuracy than students with no previous typewriting instruction.

Recommendations

The findings and conclusions of this study result in the following recommendations:

1. A given number of assignments to be completed by students should be pre-established to indicate and encourage motivation.

2. Further study should include a larger sampling and include more than one school.

3. The musical ability of students should be pretested using the Tonal Memory portion as well as the Rhythm portion of the Seashore Measures of Musical Talents.

4. A similar study should be conducted using a different combination of pretests, should as the Flanagan Tapping Test and the Drake Rhythm and Memory Test.

5. Consideration should be given to dividing the sample group into thirds and examining intelligence test scores of the upper and lower thirds as they relate to achievement in typewriting.

6. Research should be conducted comparing advanced typewriting students with the same predictive factors used in this study.

7. Research should be conducted to determine if grouping students for instruction by previous or no previous typewriting background results in higher achievement levels.

8. Since students who did not complete all assignments were included in all analysis groups, the predictive value of the pretests for students who did complete assignments is not clear. A similar study with a student sample of those who completed all or nearly all assignments should be conducted in order to properly evaluate the pretests.

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APPENDIX A

QUESTIONNAIRE

NAME _____ AGE _____ MALE_____ FEMALE_____

Yes_____ No _____ 1. Is either of your parents presently in or retired from military service.

Yes _____ No _____ 2. Is English your native language?

Yes _____ No _____ 3. Have you taken a typewriting course which was at least six weeks long or longer?

7____ 8_____ 9____ If so, check at the left what grade level you took this typewriting course.

10____ 11_____ Summer____

Yes _____ No _____ 4. Do you ever type letters, term papers, etc. for your own use?

Yes _____ No _____ 5. If so, do you use an electric typewriter.

6. I am in this class because: (check below)

_____ I want to learn to type
_____ My parents made me
_____ A friend suggested it
_____ Guidance put me here
_____ For future office occupation
_____ For present and/or college use

Yes _____ No _____ 7. Do you like to participate in athletic games (for pleasure or on a team)?

_____ 8. What game or games are you best at?

_____

Yes _____ No _____ 9. Do you play a musical instrument?
_____ If so, what?

10. How often do you play?

_____ Daily
_____ Several times a week
_____ Once a week
_____ Once a month
_____ Once a year

In the following question, "practice" means to follow an assigned group of materials to improve your playing ability.

Yes _____ No _____ 11. Do you practice this instrument?

12. If you do practice, how long do you practice?

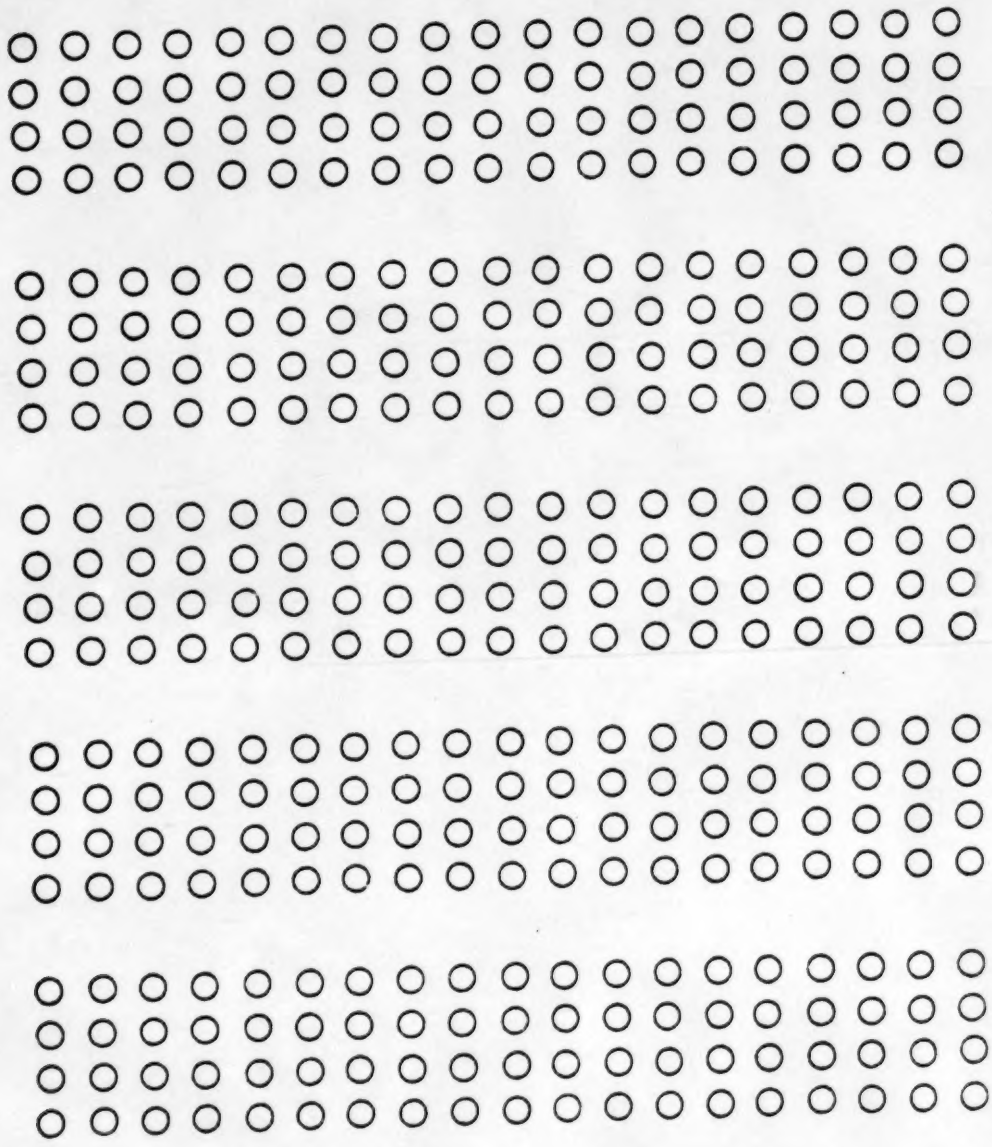
_____ 15 minutes
_____ 30 minutes
_____ 45 minutes
_____ One hour or more

Yes _____ No_____ 13. Can you sightread and play a song on your instrument?

TAPPING TEST

DATE _____ NAME _____

PERIOD _____



NAME _____ SCORE _____ CODE ___/___/___/___

DIGIT RECALL TEST

Part I--
Do not write until after all numbers have been dictated. Fill in the blocks from left to right:

										Score
1.										1. _____
2.										2. _____
3.										3. _____
4.										4. _____
5.										5. _____
6.										6. _____
7.										7. _____
8.										8. _____
9.										9. _____
10.										10. _____

Part II--
Listen to the dictation, then write the numbers in reverse order. Write only from LEFT TO RIGHT.

1.										1. _____
2.										2. _____
3.										3. _____
4.										4. _____
5.										5. _____
6.										6. _____
7.										7. _____
8.										8. _____
9.										9. _____
10.										10. _____

APPENDIX B

Enrichment activity: timed writings

may be used after completing Lesson 49

1. A 1' *speed* writing on each straight-copy ¶; determine *gwam*; circle errors.
2. A 3' control writing on ¶s 1–2 combined; determine *gwam*; circle errors.
3. If you reached a new high 1' or 3' *gwam*, record it on the appropriate chart(s) on LM page 3.
4. Type the statistical ¶s shown below, following Steps 1, 2 above.

Straight copy

all letters used | A | 1.5 si | 5.6 awl | 80% nhw

gwam 1' 3'

It is a satisfying feeling to be a winner. Every person prefers to serve on a winning team. Although the prize might not be worth either the time or effort involved, the desire to excel may justify both. Realize that team members must meet the requirements for a winning exhibition each time they play.

An office work force is a team, also; and the same basic principles apply there as apply on an athletic field. A major difference, however, is that in the office the rewards are increased pay and promotions instead of trophies and letters. Winning is fun on any team, but winning takes effort from all.

Statistical copy

all figures used | A | 1.5 si | 5.6 awl | 80% nhw

gwam 1' 3'

The Dow Jones Average of 30 industrial stocks went from 958.10 to 975.23, reducing its loss for the period to 15.52 points. The widely published average finished at the end of May with a net reduction of 21.62 points, its worst monthly showing since last February, when it gave up 41.48.

Gainers exceeded losers by greater than a 2-1 margin in the daily total of stock issues. The volume came to 16.87 million shares, only slightly ahead from 15.30 million on 11/28/76. Listed stocks that were sold over the counter came to 19.74 million prior to the close of the market.

62

62a · Conditioning practice

1. Each line twice SS (slowly, fast).
2. A 1' writing on Line 1, then on Line 2; compare gwam.

Vera Wykle quizzed the top men about the next golf match set for June
My Social Security number is 938-27-502b; my work permit number, R415
kind kindly like likely near nearly real really sure surely true truly
It is essential for him to sign the form if she is to handle the case

62b · Guided writing: sentences

1. Each line once for orientation.
2. A 1' writing on each line, guided by the 15" call of the line ending. **Goal:** To reach the end of the line exactly when "Return" is called.

Just relax and let your fingers do this work.
Our audit of the books proves their work is right.
Curve your fingers and hold them lightly over the keys.
Drop back in speed to gain the skill of typing with control.
Poise is the ability to do things well while others just look on.
The real problem of your leisure time is to keep others from using it.

62c · Guided writing: paragraphs

1. A 1' writing on ¶ 1 to determine gwam.
2. Add 4 gwam to your gwam in Step 1 for a goal rate. Note the checkpoints in ¶ 1.
3. Two 1' speed writings on ¶ 1. Try to equal your goal rate as the guides are called.
4. Type ¶ 2 in the same way.
5. A 3' writing on ¶s 1–2 combined. Erase and correct any errors you make as you type. Determine your correcting words a minute: words typed ÷ 3.

Office typists are expected to correct their errors. Making corrections takes time and skill. The greater the skill, the less time a correction requires and the lower the cost of the error. Accordingly, you are often being told now in your daily work to erase and correct the errors you make as you type a letter, a table, or a report.

It certainly pays to be skillful in correcting errors, however, it will pay better when you learn to pace the typing at just the level you can control with accuracy and remove the need to correct so many errors. About thirty seconds are required to erase and correct an error. If you make five errors in five minutes and must stop to correct them, you cut your speed fifty percent. Realize this now and begin pacing yourself.

Progress checkup 2

use after completing Lesson 50

2a ▶5 Conditioning practice

each line twice (slowly, faster)
DS between 2-line groups

alphabet Marty Javits quickly passed to Brig Wexford in the end zone.

fig/sym Your 5/19 order was for 947 saws, 1,205 rakes, and 836 hoes.

fluency They did the work right and also worked with the right form.

2b ▶10 Growth index: straight copy

1. A 1' writing on each ¶; determine *gwam* and errors on each. Record better score.
2. Two 3' writings on ¶s 1 and 2 combined; determine *gwam* and errors on each. Record better score.

all letters used | A | 1.5 si | 5.8 awl | 80% nhw

	gwam 1'	3'
A wise man commented many centuries ago that you must know	12	4
yourself. Know what you can do excellently and what you can't	24	8
do so well, and be thankful for the activities that you do very	37	12
well. After analyzing your weaknesses, strive to reduce them.	50	17
Only then can you know your potential.	58	19
As you select practice materials, try to pick drills that	12	23
are most likely to improve your typing skill. Do not pick just	24	27
those you can type easily or complete quickly. If an activity	37	31
is chosen in this way, very little learning is likely to occur.	50	36
Type exercises that will be most helpful.	58	39

gwam 1' | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12
3' | 1 | 2 | 3 | 4

2c ▶10 Growth index: statistical copy

1. A 1' writing on each ¶; determine *gwam* and errors on each. Record better score.
2. Two 3' writings on ¶s 1 and 2 combined; determine *gwam* and errors on each. Record better score.

all figures used | A | 1.5 si | 5.8 awl | 80% nhw

	gwam 1'	3'
According to the Department of Commerce, the typical 1975	12	4
house in America costs about $42,600. The shocking truth is	24	8
that between 50% and 66 2/3% of all the families could not	36	12
afford to buy the average house built in 1975 or 1978.	46	15
From 1965-1975, the average cost of a typical dwelling	11	19
in this land ranged from $22,900 to $42,600, an incredible	23	23
86% increase. Also during the decade, the mean interest rate	35	27
rose 34.5%, a range from 5.8% to 9.2%.	43	30

gwam 1' | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12
3' | 1 | 2 | 3 | 4

The Relationship Between a Linear Combination of Intelligence, Musical Background, Rhythm Ability and Tapping Ability to Typewriting Speed and Accuracy

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SUMMARY

Objectives

The primary concern of this study is the relationship between pretests of intelligence and typewriting scores; musical background and typewriting scores; rhythm ability and typewriting scores; and tapping ability and typewriting scores; as well as a combination of these pretest scores and typewriting scores of speed and accuracy.

Perspective

It appears that no typewriting pretests have been entirely successful in predicting the beginning typewriting student's success at the end of the first semester of typewriting. This study, therefore, attempts to identify any predictor or combination of predictors of a beginning typewriting student's success by employing the same dependent variables for a set of independent variables. Four different pretests were used to analyze any possible relationship between the independent pretest variables of speed and accuracy on a three-minute timed writing score.

Methods

A sample of 109 high school students were pretested using the Seashore Rhythm Test, Digit Recall Test, and the Tapping Test. The students were then posttested at the end of the first semester of instruction to obtain speed and accuracy scores from an average of three 3-minute timed writings. Additionally, the motivation control variables of assignments completed and absences were introduced into the analysis. A least squares stepwise multiple regression analysis was employed to analyze the data.

Data Source

In September of 1979, 142 students enrolled in beginning typewriting were given a background questionnaire containing personal questions and questions about their musical and typewriting history. They were then pretested to determine intelligence scores, rhythm ability scores and tapping ability scores.

The population from which the student sample was drwan consisted of lower to middle income families in Hillsborough County, Florida. The students were enrolled in six beginning typewriting classes in one school, and were taught by two teachers--two classes by the researcher and four by another teacher. Completed measures from 109 participants were obtained from the enrollment of 142 students.

Results

The stepwise results indicate that the motivation variable, assignments completed, was the most significant factor in predicting typewriting speed. Beyond motivation, the Tapping Test had a significant zero order correlation with speed. No predictor tests used in this study were able to predict typewriting accuracy.

Educational Importance of the Study

Analysis of the data obtained supports the possibility of predicting a student's typewriting speed based on motivation and the Tapping Test, the predictor variable.